Plant Document Analysis

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End of Engineering Analysis Report

ENGINEERING SPECIFICATION ANALYSIS

Focus Area: Roof floatation test.

Generated on November 25, 2025

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Section 1: Accepted Specifications for Evaluation of Roof floatation test

• Vendor Data Requirement: "Roof floatation test" is listed as a required vendor submittal during Manufacturing & site erection (12.2.xvii).

• Hydrotest / roof drain demonstration: During hydro test of open floating roof tank, contractor shall demonstrate draining of water by primary roof drain by filling the top of floating roof with water to the design water level (7.3.5.1).

• Test procedure content requirements: The tank test procedure shall specify, as a minimum, the maximum water level, the maximum air pressure, the maximum filling rates, the hold periods, emergency and normal emptying procedures, method and frequency of foundation settlement measurement, allowable limits for differential and maximum settlement of tank foundation, action to be taken when maximum foundation settlements are exceeded, the minimum test water temperature and other items considered necessary (7.3.5.3).

• Foundation survey for hydrotest: Contractor shall carry out a foundation level survey before, during and after the tank hydrostatic test taking readings at a minimum of 4 equidistant points, no more than 10 m apart along tank shell circumference and along one bottom diameter; prepare a foundation survey report (7.3.5.4).

• Hydrotest water quality limits: Austenitic stainless steel tanks — test water containing not more than 30 ppm chlorides. Carbon steel materials — potable quality with chloride content less than 250 ppm (7.3.5.5).

• Roof drain system requirements: Primary roof drain shall be the closed type using pipe and swing joints; swing joints to be of the balanced type to avoid overstressing the joint (C.3.8; C.3.4.1 notes emergency drain stainless steel).

• Calculations / alternative proof test: Calculations are required for external floating roof designs; alternative proof test shall be included in the proposal (C.3.4.2).

• Deck drainage / standing water: Roofs shall be designed and erected to eliminate accumulation of excessive standing water when drains are open; roofs shall be designed to resist wind loading (C.3.1.1, C.3.1.4).

• Emergency drain cover: Emergency roof drains shall be provided with slotted membrane fabric cover covering at least 90% of opening (C.3.3.9).

• Roof support / clearance for floatation: Adjustable roof supports for operating level of 0.75 m and cleaning/maintenance level of 1.8 m shall be furnished; bearing plates centred under each roof support (C.3.10.3).

• Requirement to include roof floatation test procedure in vendor submissions: Vendor Data Requirement list includes "Roof floatation test" and "Air leak test procedure", "Hydro-test procedures" (12.2.xv, xvi, xvii, xviii).

Section 2: Measurements Provided in Document

• Minimum foundation survey points: readings at a minimum of 4 equidistant points, no more than 10 m apart along shell circumference and along one bottom diameter (7.3.5.4).

• Hydrotest duration guidance for shell test: duration at maximum test water level shall be a minimum of one day or until foundation settlement has ceased for practical purposes (7.3.5.1).

• Chloride concentration limits for test water: ≤30 ppm for austenitic stainless steel tanks; <250 ppm for carbon steel tanks (7.3.5.5).

• Adjustable roof support dimensions (for floatation/clearance): operating level 0.75 m (30 in), cleaning/maintenance level 1.8 m (72 in) (C.3.10.3).

• Emergency roof drain cover coverage: slotted membrane fabric cover shall cover at least 90% of the opening (C.3.3.9).

• Primary drain projection into product for internal floating roofs: extended into the product minimum of 100 mm (4 in) for float designs using floats (H.4.1.10).

• Minimum rim/gap limits for seals (relevant to vapour containment when floating): primary/secondary gap area limits referenced in C.3.13 (see document) — e.g., accumulated area for primary shoe/liquid-mounted: not exceed 210 cm² per meter of tank diameter; for vapour-mounted primary: 21.5 cm²/m; secondary: 21.5 cm²/m (C.3.13 additions). (These affect seal effectiveness during floatation test.)

• Minimum rim vent / bleeder vent counts and sizes related to floating roof venting (C.3.9 / C.3.9.1 table) — numbers/sizes by tank diameter (document lists values).

Section 3: Inputs and Additional Requirements from Client (as stated in document) — and missing items called out as needed for a complete roof floatation test

• Inputs explicitly provided / required by Owner/Doc:

• Tank Data Sheets will provide specific requirements including design water level and other tank-specific data (multiple references; 1.1 and attachments).

• Vendor must submit Roof floatation test procedure as part of vendor data (12.2.xvii).

• Contractor shall include calculations for external floating roof designs or an alternative proof test in the proposal (C.3.4.2).

• Test procedure must include maximum water level, maximum filling rates, hold periods, emergency and normal emptying procedures, foundation settlement measurement method/frequency, allowable settlement limits and actions, minimum test water temperature (7.3.5.3).

• Foundation survey protocol: minimum 4 equidistant points ≤10 m spacing and along one bottom diameter (7.3.5.4).

• Hydrotest water chloride limits per material (7.3.5.5).

• Demonstration requirement: show primary roof drain empties the deck by filling deck to design water level (7.3.5.1).

• Requirements for drain type and swing joint balancing (C.3.8).

• Items the document identifies as required but that are NOT specified numerically in this document (i.e., must be provided by client/contractor for a complete roof floatation test):

• The actual design water level for the floating roof (document requires this to be specified on Tank Data Sheet but does not provide the numeric value).

• Specific maximum filling rates to be used during roof floatation test.

• Required hold period(s) for the roof floatation proof (only minimum hydrotest duration for shell given).

• Maximum allowable differential and total foundation settlement limits for the tank during test.

• Minimum test water temperature for the floatation test (7.3.5.3 requests this but no value given).

• Exact locations, sizes and capacities of primary roof drains, emergency drains and drain piping, including balanced swing joint geometry and drain pipe sizes (document specifies type/function but not sizes).

• Acceptance criteria for the roof floatation test (e.g., allowable deck deflections, buoyancy margins, leak/tightness acceptance criteria): document requires contractor to prepare procedure and demonstrate draining, but provides no quantitative acceptance thresholds.

• Details of any required instrumentation and measurement accuracy for the foundation survey (e.g., survey method, tolerances, instruments).

• Proof test loadings, if alternative proof test is proposed instead of calculations (C.3.4.2 requires inclusion but no test loading defined).

• Number, size and location of automatic bleeder vents required for specified maximum filling/emptying rates (C.3.9 requires contractor to determine based on rates; document gives minimum of two 6 in. vents but actual requirement depends on rates).

• For internal floating roofs: details of float compartments filling procedure and drain extension depths beyond the single 100 mm note (H.4.1.10 states minimum only).

• Any tank-specific seal material selection or compatibility data (document states owner will furnish details of stored liquid and sealing requirements).

Notes / Next steps (procedural, not presuming missing data)

• To complete a roof floatation test procedure compliant with this specification, the vendor/contractor must obtain from Tank Data Sheet: design roof water level, maximum fill/empty rates, tank material, stored liquid details (for seal compatibility), allowable foundation settlement limits, and any tank-specific venting/bleeder sizing or performance requirements.

• Vendor submittal must include either floating roof design calculations or an alternative proof test plan showing test loads/fixtures and pass criteria, and must demonstrate operation of primary roof drains during hydrotest per 7.3.5.1.

• Draft a checklist/template for the Roof Floatation Test procedure that meets the document's mandatory content (7.3.5.3) and references the document clauses above, or

• Extract and collate just the clause references and exact wording into a one-page vendor instruction for inclusion with the purchase order. Which would you prefer?

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